**Cell Communication in the Neuron**



* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: contains nucleus & organelles
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: receive incoming messages
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: transmit messages **a**way to other cells
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: fatty insulation covering axon, speeds up nerve impulses
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: junction between 2 neurons
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: chemical messengers sent across synapse
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: cells that support neurons
	+ Eg. **Schwann cells** (forms myelin sheath)

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (using ATP) maintains a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ potential inside the neuron.



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (nerve impulses) are the signals conducted by axons

* **Resting potential**: membrane potential at rest is said to be ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***
	+ More Na+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, more K+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, cell (overall neg. charge inside axon)
	+ Ion distribution is maintained by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(requires ATP!)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Na+ channel are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Nerve impulse**: stimulus causes a change in membrane potential
	+ **Action potential:** neuron membrane ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** = becomes more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ inside
	+ All-or-nothing response

K+ channels open

Na+ channels open

4

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Na+ channels \_\_\_\_\_\_\_
* K+ channels \_\_\_\_\_\_\_\_ and K+ goes out
* Interior of cell becomes more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* More Na+ channels \_\_\_\_\_
* K+ channels still \_\_\_\_\_\_\_
* Cell becomes more \_\_\_\_\_\_\_\_\_\_\_\_\_\_ inside

2

* **Stimulus** \_\_\_\_\_\_\_\_\_ some \_\_\_\_ channels
* *IF* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is reached, an AP is triggered



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* **\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_**
* \_\_\_\_\_ channels close

1

**\_\_\_\_\_\_\_\_\_\_** (-70mv)

\_\_\_\_\_\_\_\_\_\_\_\_\_-gated Na+ and K+ channels \_\_\_\_\_\_\_\_

1

* Return to resting state
* Na+ and K+ concentrations are maintained by **\_\_\_\_\_\_\_\_\_\_\_\_**

**Saltatory conduction**: nerve impulse \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* (unmyelinated gaps) 🡪 speeds up impulse



3

* Increase in Ca2+ causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to fuse with presynaptic membrane
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** released into synaptic cleft via \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** arrives
* Presynaptic membrane is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



4

* **Neurotransmitter** binds to **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** on postsynaptic membrane
* Possible cell responses include:
	+ Initiating depolarization and an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of this neuron (excitatory)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an action potential in the neuron

2

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** opens **\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Ca2+ enters presynaptic cell

**Neurotransmitters**

* Chemicals released from vesicles by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into **synaptic cleft**
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ across \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on neurons, muscle cells, or gland cells
* Broken down by enzymes or taken back up into surrounding cells

**Types of neurotransmitters**:

* **Excitatory**: speed up impulses by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Inhibitory**: slow impulses by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_